

An Update on Revisions to Preservation Brief #3, *Improving the Energy Efficiency of Historic Buildings*.

presented at the Historic Preservation and Energy Efficiency in Federal
Buildings Workshop

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What

A symposium was held in March of 2002 for the purpose of fact gathering in preparation for a much-needed revision of NPS Preservation Brief #3, *Improving the Energy Efficiency of Historic Buildings*. Since that time, there have been significant changes in emphasis concerning attic ventilation, vapor retardants, and insulation. Also, pressure has been growing to bring historic buildings up to new building codes. A decision to not publish the proceedings of the symposium was taken since opinion on various practices discussed at the symposium has since changed.

Who

We invited 12 participants, including engineers, architects, scientists, and preservationists from private practice, the Department of Energy, The National Trust, SHPO's, Academia, HUD and GSA to spark discussion and provide new insight into this complex topic.

Questions

Questions regarding various issues were prepared in advance to facilitate dialogue. These were broken this into 5 sessions:

- I Evaluation – Measuring the Energy Performance of Historic Buildings**
- II Thermal Control in Historic Assemblies**
- III Ventilation and Moisture Control**
- IV Air Infiltration and Windows**
- V HVAC and Codes**

Considerations

The following key considerations are still valid:

The Holistic Approach – A building functions as a system, therefore a holistic approach should be taken when evaluating its energy consumption. Factors to consider must include the building's condition, history of energy consumption, its use, and the length of time an owner will own the building.

Management of the building including physical controls to regulate the use of energy and a maintenance schedule for equipment can apply to both large and small buildings. Recognize that air conditioning is a major energy hog. Savings has a lot to

do with adjusting indoor conditioning, including the thermostat, controlling window use, and the efficiency of lighting and appliances. Lighting and appliance loads may outweigh the space conditioning costs in larger office buildings.

Insulation – Adding insulation is most effective first in the attic, then the exterior of the foundation, then walls, and finally the floor (if at all). For historic preservation projects, the effect of disrupting historic materials must be weighed against the effect of adding insulation. Adding insulation to solid masonry walls can impact the durability of the masonry because the material outside of the insulation will be subjected to greater stress of low temperatures, higher moisture, and longer drying periods.

Infiltration and Exfiltration – We concluded that it is more important to focus on Infiltration and exfiltration as the major sources of heat loss. These combine to create a chimney effect in multi-story buildings, especially in balloon frame construction. This can lead to problems not only with heat loss but moisture. Blower door tests are effective in identifying areas of infiltration and exfiltration.

Windows – Not only are historic windows important character-defining features of historic buildings, window replacement in most cases is **not** cost effective. The use of caulking, weather stripping and exterior storm windows is recommended.

Questions Remaining

The insulation of exterior walls continues to be a topic of much debate.

- Weighing the value of adding insulation to exterior walls in historic buildings is often difficult.
- Even if payback for adding insulation to the exterior walls is minimal, insulation of exterior walls is a standard building practice which makes it difficult to recommend against it.
- Reports of damage to historical materials and finishes, especially on wood sided structures due to added insulation are common, but difficult to predict.

Moisture related questions. Theories and methods for dealing with moisture management in buildings have been evolving. New ASHRAE standards for evaluating the moisture performance of buildings are due to come out in the very near future. This could have a significant impact on the current and widely-used practice of adding vapor retardants.

Where do we go from here?

- A crucial notion that came across the discussions of our symposium is that the process of improving the energy efficiency of historic buildings requires a

multiple approach. It is extremely important to look at the building's use, maintenance, and operation, as well as the physical properties and conditions of the building when planning an energy conservation project.

- It is difficult for building owners and operators to evaluate the myriad opinions, available technology, and other issues influencing the decision-making process without a reasonable method that identifies steps towards making informed decisions. It became clear that rather than give specific advice on specific treatments or retrofit measures, the brief should provide a guide for making decisions.
- Research... research... research. The need for “lab” quality research on buildings and the use of a surgical research model was highlighted.
- More studies that evaluate the post-treatment efficacy of various treatments was also identified.
- Federal funding of this type of research is sorely needed. Commitment to long term research projects is problematic when the funding is allocated on a yearly basis.